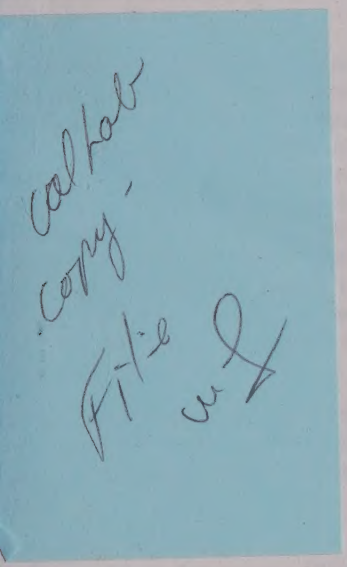
ÅTRON
ORPORATE HEADQUARTERS
) Division St., Campbell, California 95008
8) 370-5000

MODEL PPS 8200 SERIES

DIRECT CURRENT PLASMA POWER SUPPLY

AND

CONTROL



RATED: 5 KW - MODEL PPS 8205

10 KW - MODEL PPS 8210

FOR 208/220/240V, 60 HZ, 3Ø INPUT

OTHER VOLTAGES AND FREQUENCIES AVAILABLE

INSTALLATION AND OPERATION MANUAL

STERN REGIONAL OFFICE 30 Main Street, Danbury, Connecticut 06811 (203) 743-4416

ERÅTRON

TECHNICAL DATA SHEET

Series PPS-8200 Direct Current Plasma Power Supplies

Applications: The Series PPS-8200 DC Plasma Power Supplies are designed for continuous operation in a variety of plasma processes. These include plasma etching, sputter deposition, pre-deposition etching, and especially, magnetron sputtering for semiconductor and computer memory fabrication.

Control System: This family of supplies features a proprietary SCR firing circuit with ERATRON's patented *Current Source Control Circuit** (CSCC) in the rectifier transformer primary.

Plasma Process Control: *Current Source Control Circuit* eliminates the problems of conventional saturable reactor control and standard SCR primary control for DC power supplies. The ERATRON systems of SCR firing circuit, the CSCC, and high speed current regulation provides hitherto unrealizable control precision and arc-down recovery. Regulation is better than 1 part per thousand full scale. During arc-down, stored system energy is dissipated in a special circuit as part of the patented CSCC. The system can be made to match *any* process by changing its operating characteristics with a simple circuit card substitution.

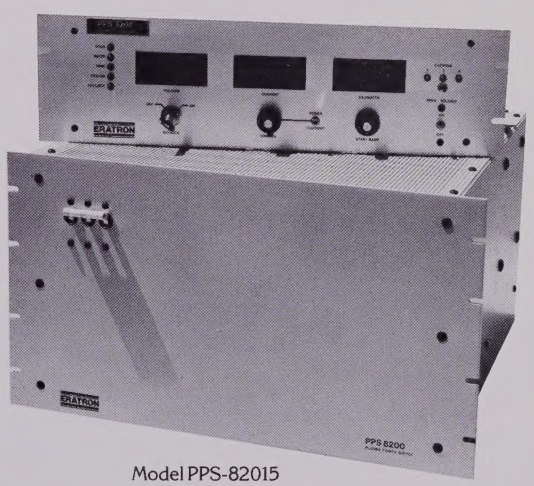
Circuit Construction: All solid state for minimum heat loss and high efficiency. Efficiency is rated at better than 95%, a substantial increase over conventional mag-amp supplies.

Automation Interface: Standard off-the-shelf systems include provisions for remote ON/OFF, remote voltage/current/power control using an analog 0-5 Vdc control bus. Optional equipment includes an RS-232 digital port. A 0-5 volt analog output bus is also provided to operate remotely located monitoring instrumentation.

Reduced Footprint: 5 and 10 kW systems take up 392 square inches and can be stacked up to 3-high with the use of optional stacking pins and rails. Compact 1.5 and 3 kW power sections mount in a standard 19-inch rack using only 10½ inches of height.

Both the PPS-8205 and 8210 take advantage of good design practices to extend their rated power operating range. The rated power output of 5 or 10 kW at the reduced plasma operating voltages of contemporary magnetron processes can be exceeded to provide an extended power envelope as shown in the illustrative diagrams. Extended power ranges are available up to 6.75 kW and 13.5 kW for the PPS-8205 and 8210 respectively shown in the graphs appearing on page 2.

Model PPS-8210



Model PPS-82015

* US Patent Number 4,314,324

Options

Digital Metering: 3½ digit LED meters for voltage and current. With the optional Constant Power Control, a digital power meter can also be added.

Interlock Strings: Up to 5 additional interlock terminal sets can be added to the existing standard interlock terminal set.

Elapsed Time Meter: Accumulates total time that power has been applied to process.

Anode and Cathode Metering: Monitors anode and cathode voltages.

Bias: Allows either positive (+) or negative (−) or both outputs to be floated above ground. In addition, a separate bias supply can be provided.

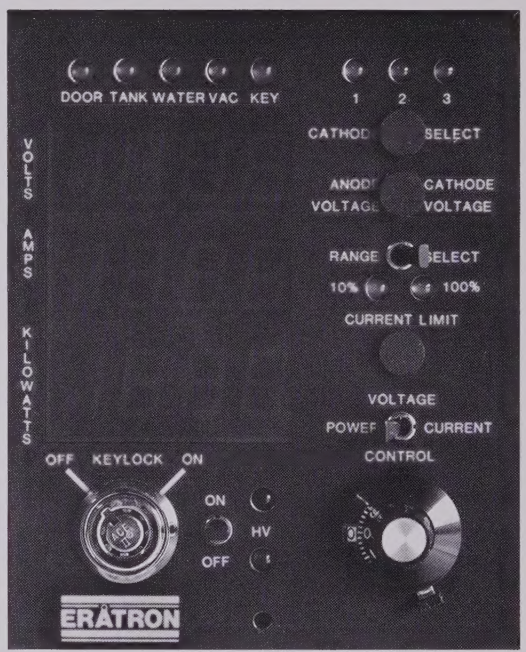
Regulation Modes: Current Regulation is standard
- Power Regulation with Current Limiting
- Power Regulation with Current Cutback
- Voltage Regulation with Current Limiting
- Voltage Regulation with Current Cutback

10:1 Range Option: This option provides a 10:1 reduction of full scale operating power for high power regulation and control linearity. For example: PPS-8205 rated for up to 5.0 kW full scale, when in the 10% Range Mode provides up to 500 W. However, in this mode both the regulation and control linearity is an order of magnitude better at 1 part in 10,000 full scale respectively. This option can be exercised via remote switching control.

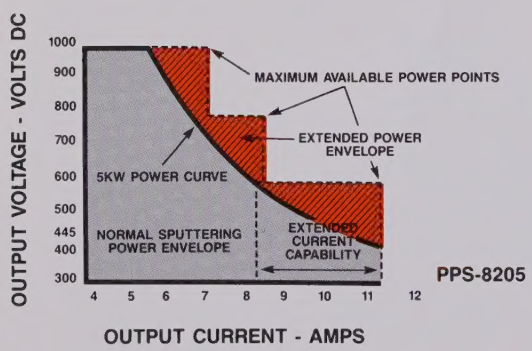
Multiple Cathode Switching: Provides switching for up to 3 cathodes. Cathode selection for switching is from the remote control panel.

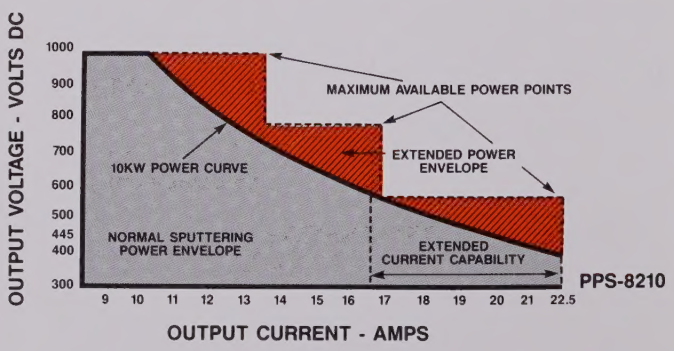
Kilowatt Hour Meter: Highly accurate, digital readout, combination AC Wattmeter/Watthour meter. Monitors AC to the high power circuits. Two position front panel switch selects either kW or kWh: kW provides instantaneous readings updated every second: kWh provides continuous accumulation of the product of Power X Time.

Quarter Rack Digital Control Panel: This optional control panel provides all standard instrumentation with digital metering of voltage, current, and power in one quarter of the space normally used by a standard 19-inch control panel. In addition, the quarter rack controller can be equipped with such options as Constant Voltage Control, Multiple Cathode Switching, Anode and Cathode Switching, and 10:1 Range Select.



QRP-8400
Control Panel





General Specifications

Model		PPS-82015	PPS-8203	PPS-8205	PPS-8210	PPS-8215	PPS-8220	PPS-8230	PPS-8240
Rating (KW)		1.5	3	5	10	15	20	30	40
Maximum Power (KW)		1.5	3	6.75	13.5	15	20	30	40
Output Voltage (VDC)		Transformer tapped secondary 600/800/1000V (Up to 7000V available on special order)							
Output Current (Amps)	@ 600V	2.5	5	11.25	22.5	25	33.3	50	66.7
	@ 800V	1.9	3.8	8.4	16.9	18.8	25	37.5	50
	@ 1000V	1.5	3	6.8	13.5	15	20	30	40
Output Regulation Normal Operation 10:1 Range Select		1 Part Per 1000 Full Scale 1 Part Per 10,000 (10% = Full Scale)							
Meter Resolution		1 Part Per 1000 (Digital)							
Meter Accuracy		1 Part Per 1000							
Control Linearity		1 Part Per 1000							
Input Voltage and Frequency Models PPS 82015 through PPS 8220		208/220/240 VAC, ±10%, 3 Phase, 50/60 Hz OR 380/415 VAC, ±10%, 3 Phase, 50 Hz OR 440/480 VAC, ±10%, 3 Phase, 60 Hz (Special Order)							
Input Voltage and Frequency Models PPS 8230 through PPS 8240							380/415 VAC, ±10%, 3 Phase, 50 Hz OR 440/480 VAC, ±10%, 3 Phase, 60 Hz		
Dimensions		19"W x 16.75"D x 10.5"H (1)		14"W x 28"D x 28"H			14"W x 32"D x 28"H	16" x 34.5"D x 34.5"H	
Weight (lbs)		125	150	450	650	700	920	1095	1420

(1) Suitable for mounting in a standard 19" rack.

Ordering Information

Specify the following:

1. Model Number (Example: Model PPS-8210)
2. Input Voltage (see GENERAL SPECIFICATIONS)
3. Input Frequency (see GENERAL SPECIFICATIONS)
4. Desired Output Voltage Connection (see GENERAL SPECIFICATIONS. Example: 600, 800, or 1000 VDC.)
5. Desired Options

Note: All units are prepared for shipment via electronic (Air Ride) van. Shipment via air requires extra preparation charges. Motor freight is not recommended. All overseas shipments are quoted C.I.F. and air freight preparation is included.

Corporate Headquarters: 590 Division Street, Campbell, California 95008 (408) 370-5000 TLX 550378
Eastern Regional Office: 30 Main Street, Danbury, Connecticut 06811 (203) 743-4416

DS-8200 7/86 3M

1.0 INTRODUCTION AND SPECIFICATIONS

1.1 Introduction

1.1.1 The Model PPS 8200 Plasma Power Supply is designed for continuous operation in a variety of plasma processes; i.e., plasma welding, plasma etching, sputter deposition and etch, etc. This design uses conservatively rated industrial components which have been proven reliable over years of rugged uses.

1.1.2 The PPS 8200 is housed in a rugged industrial enclosure with casters.

1.1.3 A remote control panel is provided for indicators and control.

1.2 General Specifications

	MODEL 8205	MODEL 8210
OUTPUT POWER (NOMINAL)	5 KW	10 KW
OUTPUT POWER (MAXIMUM)	6.75 KW	13.5 KW
OUTPUT VOLTAGE	600/800/1000 VDC	600/800/1000 VDC
OUTPUT CURRENT	11.25/8.43/6.75	22.5/16.9/13.5
OUTPUT REGULATION	LESS THAN 1% OF SETPOINT CURRENT	
INPUT VOLTAGE	208/220/240-3Ø	208/220/240-3Ø
INPUT CURRENT	25A @ 208V	50A @ 208V
INPUT FREQUENCY	STANDARD: 60 HZ OPTIONAL: 50 HZ	60 HZ 50 HZ
PHYSICAL SIZE POWER SECTION	W D H 14" 28" 28"	W D H 14" 28" 28"
PHYSICAL SIZE REMOTE CONTROL PANEL	W D H 19" 3½" 5¼"	W D H 19" 3½" 5¼"
TOTAL WEIGHT	450 LBS	650 LBS

NOTES:

1. No time limit on 100% continuous short circuit.
2. Provision for external interlocks provided.
3. Cooling by forced air internal fans.
4. Primary circuit breaker included.
5. Indicators: AC "Power On", "High Voltage On", "Bias On", "High Voltage Off", external "Interlocks", DC Voltmeter and DC ammeter.
6. Controls: High Voltage ON/OFF, bias ON/OFF, power adjust, start ramp adjust and remote/local (switch on rear).

2.0 INSTALLATION INSTRUCTIONS

2.1 Introduction

2.1.1 This section of the manual contains information regarding the correct installation of the PPS 8200. It is recommended that the contents of this section be reviewed carefully before attempting to operate the supply. Should any questions or difficulties arise, please contact ERATRON, 590 Division St Campbell, California 95008; Telephone (408) 370-5000.

2.2 Shipping Information

2.2.1 The power supply is normally shipped via Electronic Air Ride Van to avoid damage in transit. Upon receipt, inspect the unit for possible damage. If any damage whatever is suspected, contact the carrier immediately.

2.3 Input Power

2.3.1 Operating power for the unit is 208/220/240 VAC, 3 phase 3 wire 60 Hz with earth (ground). The input terminal is located inside the power section under the rear cover. Taps are provided to match power supply input to line voltage. See Section 3.2. A tag is attached to the input terminal (TB-4) indicating the input voltage at the time of shipment. If your supply voltage is different than the voltage indicated, it will be necessary to change the wiring at the transformer primary. DO NOT CHANGE THE WIRES ON THE "0" TAPS. Change only the wires on the 208/220/240 taps. Make sure each of the three phase wires is on the same numbered tap, i.e., each on the "208" tap.

2.3.2 An earth (safety) ground must be installed to insure personnel safety and correct operation of the power supply.

IMPORTANT: Failure to install a proper earth ground can cause a safety hazard as well as result in equipment damage which could void the warranty.

A ground must be connected from the earth ground stud (located near the left caster as you face the power section rear to the vacuum tank or baseplate. An additional ground must be connected from the same earth ground stud to earth ground. This earth ground may be power company ground, a metal building frame or metal water system provided it is determined that the ground chosen is truly at earth potential.

2.4 Remote Control Panel

2.4.1 The remote control panel is housed in a standard 19" wide chassis and is supplied with a 20 foot cable.

2.4.2 An auxiliary interlock switch completes the circuit between terminals 10 & 11 on the rear of the control panel.

2.4.3 Terminals 8, 9, 12 & 13 must be connected by external jumpers or switches.

2.5 Output Connections

2.5.1 Taps are provided on the secondary of the transformer for selecting maximum output voltage. Best operation of the system requires setting of output at lowest setting above normal system requirements.

2.5.2 The output connections, as shipped, are noted on the tag attached to the input terminal. See Section 2.3.1.

2.5.3 To change output voltage, the following procedure is used:

2.5.3.1 Local Terminal Strip TB1 inside the power section under the rear cover. TB1 is on the right as you face the power section rear.

2.5.3.2 Move the three wires leading from the Terminal Strip to the Rectifier Stack as shown below:

600 V - Connect to TB1-1, 4, 7

800 V - Connect to TB1-2, 5, 8

1000 V - Connect to TB1-3, 6, 9

2.5.3.3 Locate the Regulator Box (gold) under the power section front cover at the lower right.

2.5.3.4 Change the jumper between points X, Y ,Z as shown below:

600 V - Jump Y-Z

800 V - Jump X-Y

1000 V - No Jumper

IMPORTANT: ANY TIME OUTPUT VOLTAGE IS CHANGED VIA TB1 CONNECTIONS, JUMPERS ON THE REGULATOR MUST BE CHANGED ACCORDINGLY. FAILURE TO DO SO COULD RESULT IN EQUIPMENT DAMAGE AND VOID THE WARRANTY.

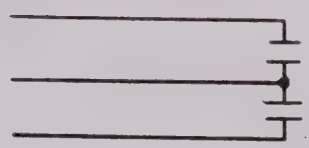
2.6 Remote Connections

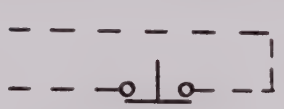
2.6.1 If it is desired to operate and control the power supply remotely either from a rate monitor, microprocessor or computer, etc., the following connections must be made to TB1 located on the rear of the control panel:

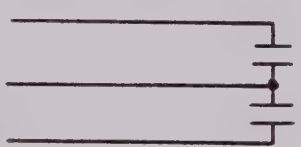
PLEASE SEE NEXT PAGE

CONTROL PANEL CONNECTIONS
(WITH INTERLOCK STRING

TERMINAL NO.	FUNCTION
TB1-1	CURRENT METER DRIVE, 0-5V = 0 - Full Scale
2	METER SIGNAL COMMON
3	VOLTMETER DRIVE, 0-5V = 0-1000 VDC
4	CONTROL COMMON
5	RAMP SIGNAL INPUT 0-5V, 5V = MAX RAMP
6	CURRENT SIGNAL INPUT 0-5V, 5V = FULL CURRENT
7	+24 VDC COMMON
8	DOOR INTERLOCK
9	WATER INTERLOCK
10	(SEE TARGET SWITCHING) INTERCONNECT FOR MULTI-CATHODE OPERATION)
11	+24 VOLT = POWER ON
12	REMOTE OFF, PULSE OPEN = OFF
13	
14	REMOTE ON, PULSE CLOSED = ON
15	
16	HV OFF LIGHT, 24 VDC = HV OFF (20 mA Max)
17	
18	TANK INTERLOCK
19	VACUUM INTERLOCK
TB1-20	POWER METER DRIVE, 0-5V, 5V = FULL POWER







NOTES:

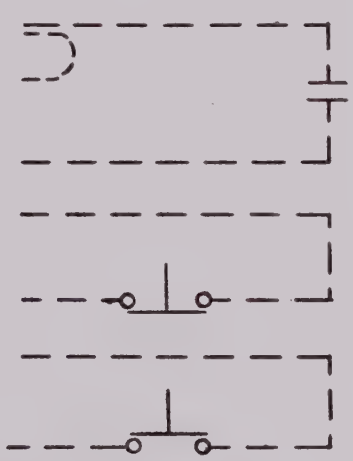
1. For external indication of HV OFF connect indicator across Term 16 (24 VDC) and Term 7 ground.

2. For external indication of HV ON connect indicator across Term 15 and Term 7.

3. For Auto pressure control use signal from Terminal 3 to Terminal 2.

CONTROL PANEL CONNECTIONS
(WITHOUT INTERLOCK STRING

TERMINAL NO.	FUNCTION
TB1-1	CURRENT METER DRIVE, 0-5V = 0 - Full Scale
2	METER SIGNAL COMMON
3	VOLTMETER DRIVE, 0-5V = 1-1000 VDC
4	CONTROL COMMON + 5V
5	RAMP SIGNAL 0-5V INPUT, 5V = MAX RAMP
6	CURRENT SIGNAL 0-5V INPUT, 5V = FULL CURRENT
7	+24 VOLT COMMON
8	N.C.
9	REMOTE INTERLOCKS
10	PULSE OPEN = HV OFF
11	JUMPER, SEE NOTE 4
12	REMOTE OFF, PULSE OPEN = OFF
13	
14	REMOTE ON, PULSE CLOSED = ON
15	
16	HV OFF LIGHT, 24 VDC = HV OFF (20 mA Max)
17	N.C.
18	N.C.
19	N.C.
TB1-20	POWER METER DRIVE 0-5V, 5V = FULL POWER



NOTES:
1. For external indication of HF OFF connect indicator across Term 16 (24 VDC) and Term 7 ground
2. For external indication of HV ON connect indicator across Term 15 and Term 7.
3. For Auto pressure control use signal from Terminal 3 to Terminal 2.
4. Jumper required between TB1-9 and TB1-10 when Target Switching Water Interlocks not used.

Anode/Cathode Meter Option

For resistive anode bias, install 6-750 ohm 225 watt bias resistors externally as shown on PPS 8205/10 Main Frame Schematic #P12-03678 and remove ground connection on Positive Output Terminal. Failure to ground bias resistors can cause a safety hazard as well as result in equipment damage which could void the warranty.

TARGET SWITCHING OPTION INTERCONNECT
(WITHOUT INTERLOCK STRING -

POWER SUPPLY MAIN FRAME	TARGET SWITCHING ASSEMBLY REAR PANEL	CONTROL PANEL ASSEMBLY REAR PANEL	DESCRIPTION	
	TB1-1		* 110 VAC low (white)	CUSTOMER SUPPLIED INPUT
	TB1-2		* 110 VAC high (black)	
	TB1-3	TB1-25	* +24V common	CONTROL CABLE SUPPLIED WITH TARGET SWITCHING OPTION
	TB1-4	TB1-30	* Cathode 1 enable	
	TB1-5	TB1-29	* Cathode 3 enable	
	TB1-6	TB1-15	* HV ON = 24V	
	TB1-7	TB1-18	* +24 VDC	
	TB1-8	TB1-26	* Cathode 1 ON	
	TB1-9	TB1-28	* Cathode 3 ON	
	TB1-10	TB1-27	* Cathode 2 ON	
	TB1-11		Cathode status common	CLOSED TO ENABLE
	TB1-12		Cath 1 high current	
	TB1-13		Cath 2 high current status	
	TB1-14		Cath 3 high current status	
HV OUT	** HV IN		High voltage line from power supply	
	**Cathode 1		High voltage line to cathode 1	
	**Cathode 2		High voltage line to cathode 2	
	**Cathode 3		High voltage line to cathode 3	
		TB1-9	Interlock common	
		TB1-23	Cathode 1 water interlock	
		TB1-21	Cathode 2 water interlock	
		TB1-22	Cathode 3 water interlock	

* NOT REQUIRED ON 7900 SERIES POWER SUPPLIES
** TERMINALS INSIDE TARGET SWITCHING ASSEMBLY

TARGET SWITCHING OPTION INTERCONNECT
(WITH INTERLOCK STRING

POWER SUPPLY MAIN FRAME	TARGET SWITCHING ASSEMBLY REAR PANEL	CONTROL PANEL ASSEMBLY REAR PANEL	DESCRIPTION	
	TB1-1		* 110 VAC low (white)	CUSTOMER SUPPLIED INPUT
	TB1-2		* 110 VAC high (black)	
	TB1-3	TB1-25	* +24V common	CONTROL CABLE SUPPLIED WITH TARGET SWITCHING OPTION
	TB1-4	TB1-30	* Cathode 1 enable	
	TB1-5	TB1-29	* Cathode 3 enable	
	TB1-6	TB1-15	* HV ON = 24V	
	TB1-7	TB1-18	* +24 VDC	
	TB1-8	TB1-26	* Cathode 1 ON	
	TB1-9	TB1-28	* Cathode 3 ON	
	TB1-10	TB1-27	* Cathode 2 ON	
	TB1-11		Cathode status common	CLOSED TO ENABLE
	TB1-12		Cath 1 high current	
	TB1-13		Cath 2 high current status	
	TB1-14		Cath 3 high current status	
HV OUT	** HV IN		High voltage line from power supply	
	**Cathode 1		High voltage line to cathode 1	
	**Cathode 2		High voltage line to cathode 2	
	**Cathode 3		High voltage line to cathode 3	
		TB1-10	Interlock common	
		TB1-23	Cathode 1 water interlock	
		TB1-21	Cathode 2 water interlock	
		TB1-22	Cathode 3 water interlock	

* NOT REQUIRED ON 7900 SERIES POWER SUPPLIES
** TERMINALS INSIDE TARGET SWITCHING ASSEMBLY

Power/Current select switch will provide either power or Current control. In the Power Mode, the control knobs selects % of maximum output power. Both voltage and current will vary depending on setting.

3.4.2 Either "Power" or "Current" may be selected as the operating mode. It is recommended however that the "Current" mode be used when "conditioning" a new cathode. This will allow for proper burn in of the cathode and prevent extreme over currents which could cause cathode damage.

3.5 Ramp Control

3.5.1 Ramp Control is effective after output power is turned on. Ten (10) setting is approximately two (2) minutes with linear control to minimum (Millisecond) control at Zero (0). After initial ramp time, changing setting or recovery from short circuit occurs in minimum time.

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5.0 RECOMMENDED SPARE PARTS FOR PPS 8205 - 8210

	QUANTITY	PART NUMBER	DESCRIPTION
	4	40-00097-00	Movistor, SKVA20B250
	2	40-00094-00	Movistor, V550PA80A
NOTE 1	3	40-00150-00	SCR Assy CD430840
	6	40-00077-00	Diode CS412499
	1	38-00059-00	Voltage Regulator
	1	24-00009-00	Amber LED
	1	24-00008-00	Green LED
	1	24-00003-00	Red LED
	4	40-00142-00	Diode, MDA 100
	4	40-00007-00	Diode, IN4001
	2	40-00046-00	Zener, IN4744
NOTE 2	1	SEE NOTE 2	PPR7900 Regulator
NOTE 3	1	98-00020-01	FPE602CF Firing Circuit
	1	34-00003-00	Control Relay, IDEC RR3BU
	6	40-00005-00	Diode, MR 754
	5	30-00004-00	Fuse, 3AG-5
	5	30-00012-00	Fuse, 3AG-2
	1	93-00006-00	Capacitor Assembly
	1	93-00005-00	Resistor Assembly
	1	92-00013-00	24V Power Supply PCB
	1	92-00015-00	Voltage Sense Board
	6	92-00016-00	SCR Snubber "A"
	1	92-00017-00	SCR Snubber "B"
	1	92-00024-00	Current Sense Board

NOTE 1 40-00073-00 can be substituted

NOTE 2 Units with Constant Current only, use PPR7900CC, 98-00026-00

Units with Constant Current/Constant Power, use PPR7900CP, 98-00027-00

Units with Power Metering Option, use PPR790CPM, 98-00028-00.

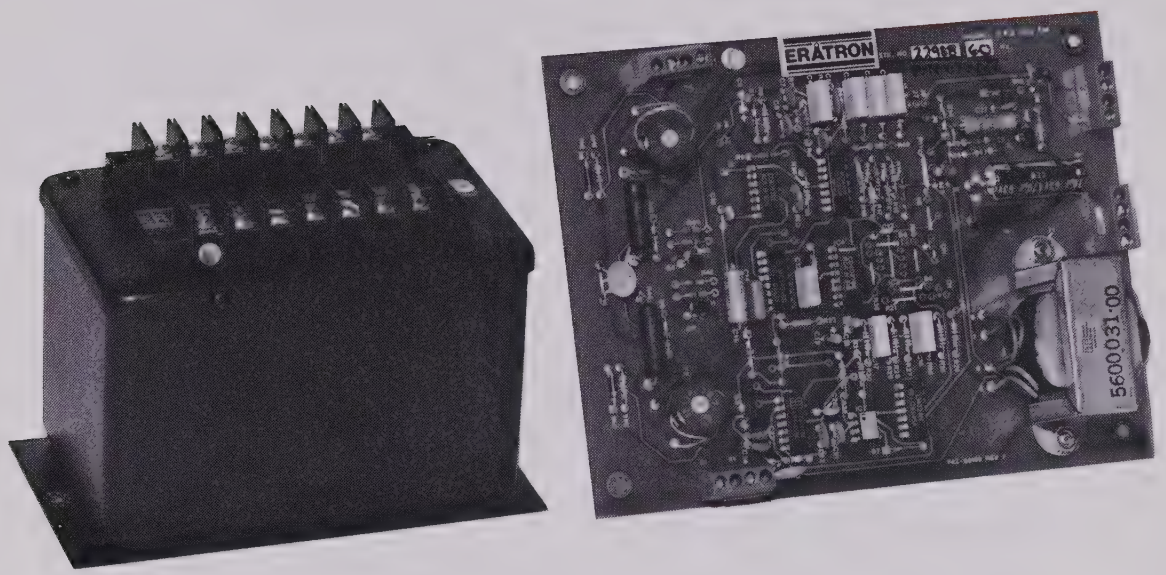
Units with Constant Voltage Option, use PPR7900CV, 98-00029-00.

NOTE 3 Units for 50 Hz operation, use FPE603CF, 98-00021-03.

ERÅTRON

TECHNICAL DATA SHEET

Series FP SCR Gate Drives



Single Phase SCR Gate Drive, Enclosed & Open

Features:

- Solid State Reliability
- Compact Size
- Line/SCR "Noise" Immune
- 0 – 5 Volt DC or 0 – 5 MA Control
- Each SCR Drive Totally Isolated

General Description

The FP Series of SCR Drives is a competitive answer to the need for a high reliability SCR firing circuit which also yields improved specifications for system performance and control.

The FP Series utilizes a proprietary "Phase Locked Loop" technique (PLL) to reject power line harmonics and SCR spikes. Additional significant improvement in noise immunity is achieved by using CMOS integrated circuits throughout.

Designed with conservatively rated CMOS integrated circuits, performance reliability is taken one step further by subjecting each unit to burn in at 100°C for 96 hours prior to shipment.

The FP Series is available in both single and three phase configurations, including 50 and 60 Hz timing. A wide variety of options provides the user/power system designer with not only flexibility but reliability not previously available.

Control

Control can be accomplished with a conventional voltage or current signal. The standard is 0 – 5 VDC or 4 – 20 MA into 1000 ohms for 0 – 180° conduction. Response time is 20 micro-seconds from control command to full stabilization.

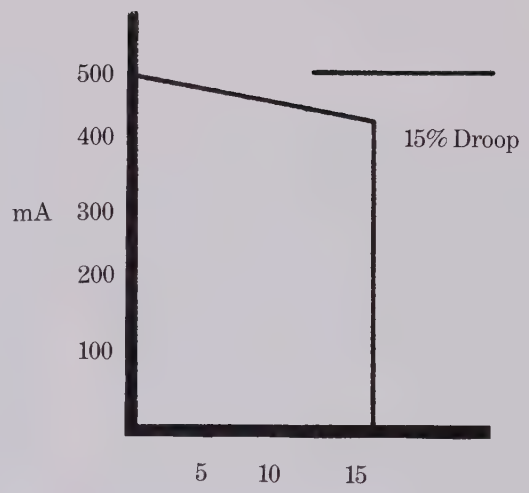
Application Flexibility

Each SCR Drive (K-G output) is totally isolated on all models. It is no longer necessary to set up rectifier configurations for common cathode firing only. This allows further design optimization for heat-sinking and other circuit considerations.

Delta-Wye transformer compensation (30° advance or retard), required when three phase rectifier transformers are applied, is achieved by simply adding a jumper to the circuit board as opposed to the addition of costly control transformers.

Phase Sensing

The three phase circuit uses a single phase input transformer, zero crossing detector and a phase lock loop, locked at six times the line frequency and the necessary logic to sort out the individual phases. Because of the synthesized waveform, extremely heavy but stable filtering is put into the zero crossing detector. (The resultant constant phase shift is compensated for digitally). With this design, the detector will hold on to the correct phase position even with the absense of a few cycles.



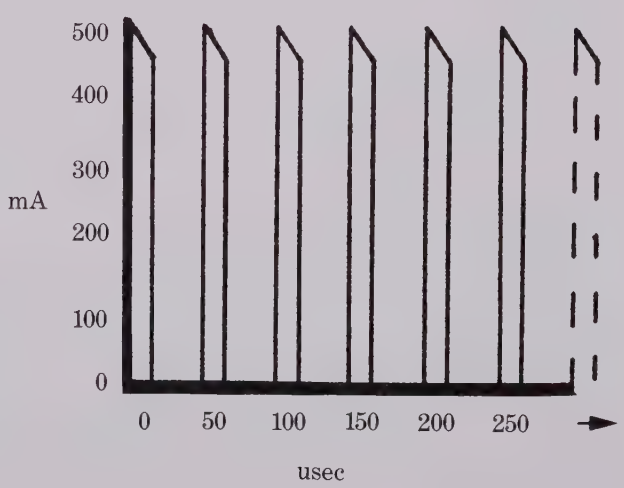
Single Gate Pulse

SCR Interface

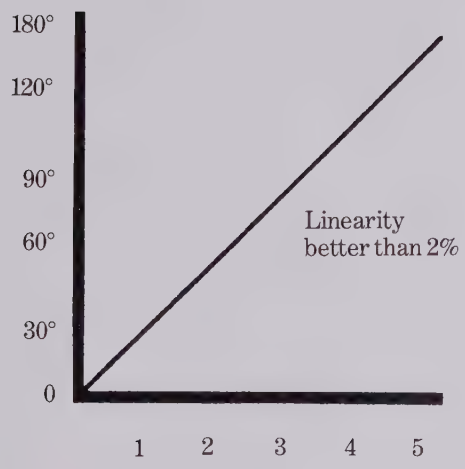
The output pulses are coupled to the SCR gates through high-isolation pulse transformers which are hi-pot tested at 3 KV at 100°C. The hardfire gate pulse rise time is 50 nanoseconds and will drive any commercial SCR. The SCR is actually gated by a train of 15 microsecond pulses at 20 KHz (30% duty cycle). The SCR gates are not driven negative with respect to the SCR cathode. This characteristic improves circuit reliability and extends SCR life. The driving compliance is 20 volts open circuit and 0.65 amperes into 1 ohm. The symmetry error is less than 1° (0.3%).

Environmentally Protected

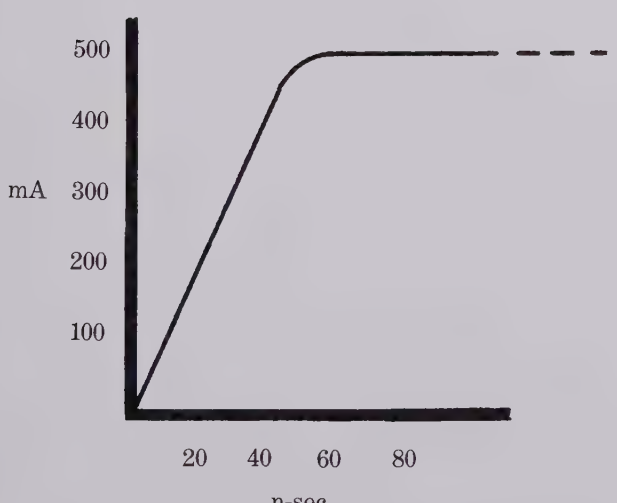
The FPE (enclosed) style gate drives are resistant to all aspects of a typical industrial environment. Each unit is enclosed in a painted metal container. This reduces circuit failure caused by environmental dust and dirt or physical tampering. All external connections are made from the two terminal strips mounted on the lid.



Typical Pulse Train



Control Linearity



Pulse Rise Time
into 5 Load

Options Available

Soft Start. This feature is STANDARD with all models of the Series FP SCR Gate Drives. An automatic ramp from zero to the set point is introduced each time power is applied or each time a manual reset (inhibit) occurs. A single resistor controls the soft-start ramp from 100 ms to 100 seconds. Unless otherwise specified a soft-start ramp of 1.0 second will be supplied.

Soft Start Ramp After Power Up With No Soft Start After Inhibit. Start time is ramped upon power up and is not ramped after the reset (inhibit) is activated. (Not recommended for most applications).

Phase Rotation Detection and Inhibit. If incorrect phase connections are made to the mains input terminals, the internal inhibit circuit will automatically activate and turn off the firing pulses to the SCR's. An LED will also illuminate to indicate improper phase connections.

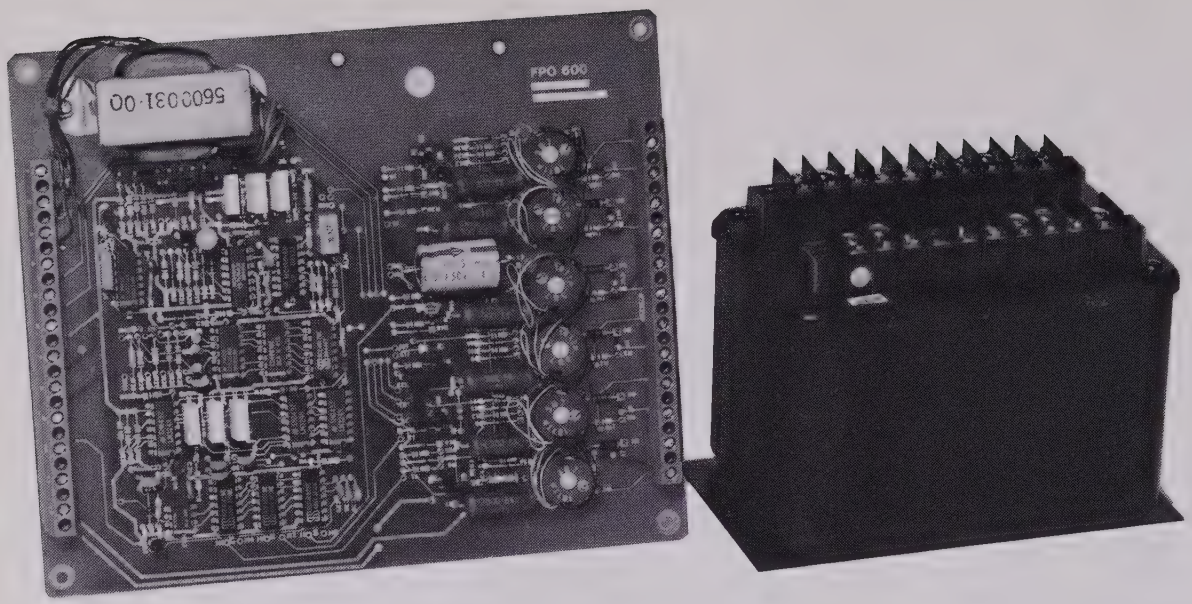
Phase Rotation Indicator Remote Output. An 8 vdc signal is provided for the user whenever an incorrect phase rotation condition exists.

30° Advance. Used in Delta-Wye transformer applications. This compensation is normally accomplished by adding special control transformers. This feature can represent substantial cost savings in numerous applications.

Current Control. Can be substituted for the standard 0 – 5 vdc control normally supplied. Current range (e.g. 4 – 20 ma) must be specified at time of order.

Non Standard Voltage Control. Can be substituted for the standard 0 – 5 vdc control normally supplied.

Other Options. May be available on special request. Consult your factory representative for details.



Three Phase SCR Gate Drive, Open & Enclosed

Ordering Information

In order to get the SCR Firing Circuit you need for your application choose ONE specification from each of the first four columns and as many specifications as required from the OPTIONS list:

FP E 602 D0.4G

TYPE	STYLE	OUTPUT	INPUT
FP-Firing Circuit Phase Control	E-Enclosed metal box	2-1 phase, 2 pulse	0-120V, 60hz
	O-Open Circuit Board	3-3 phase, 3 pulse	1-120V, 50hz
		4-two 1 phase, 2 pulse in parallel	2-240/480V, 60hz
		6-3 phase, 6 pulse	3-240/480V, 50hz

Options

A. Without soft start
B. Soft start ramp after power up only (not recommended for most applications)
C. Soft start ramp = 1 MS
D. Soft start ramp (time follows)
E. Phase rotation detection and display (120V)
F. Phase rotation (240V)
G. Phase rotation (480V)
H. Output for remote phase rotation detector
J. 30° Advance
L. Current Control (specify range)
R. Phase rotation inhibit at opposite end
V. Soft start ramp 0.5 second
X. Connected for 480 volts

ERATRON

Corporate Headquarters: 590 Division Street, Campbell, California 95008 (408) 370-5000 TLX 550378

Eastern Regional Office: 30 Main Street, Danbury, Connecticut 06811 (203) 743-4416

DS-FPE 10/86 3M

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DEC - 2 1986

MENSIONS ARE IN INCHES
TOLERANCES
LES ± 1°
CTIONS ± 1/64
ACE DEC ± .015
ACE DEC ± .030

SIGNATURE AND DATE		
DRAWN	Ed Rodney	4-24-85
DRAFTG CHK	M. JOHNSON	4/85
APVD	Robert Evans	4/85

INVENTORY NO.
— —

XT ASSY | USED ON
APPLICATION

DO NOT SCALE DWG.

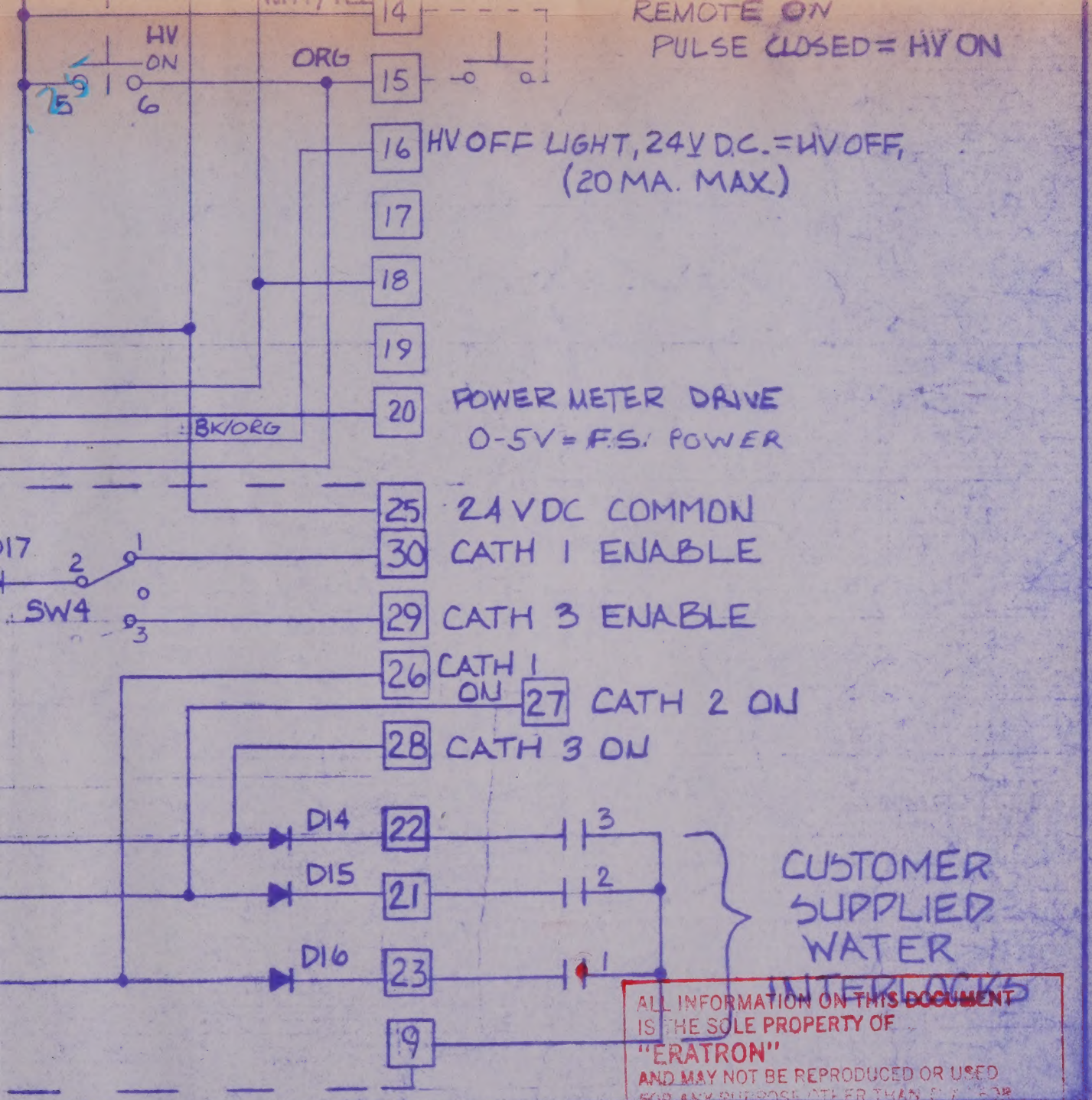
ERATRON

1129 DELL AVENUE
CAMPBELL, CALIFORNIA
95008

TITLE SCHEM. PPS 8205 208/220/240V

SIZE	DRAWING NO.	REV.
D	99-00013-01SC	N1

SCALE — SHEET 1 OF 1



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P22-000703

ENSIONS ARE IN INCHES
TOLERANCES
S ± 1°
IONS ± 1/64
E DEC ± .005
E DEC ± .015

SIGNATURE AND DATE	
DRAWN	
DRAFTG CHK	
APVD	

ASSY | USED ON
APPLICATION

ERATRON
505-F VANDELL WAY
CAMPBELL, CALIFORNIA
95008

TITLE SCHEMATIC: CONTROL PANEL PPS-STD ANALOG

SIZE D | DRAWING NO. 99-00015-SC H

SCALE NONE | SHEET 1 OF 1